SMAQMD BACT CLEARINGHOUSE

CATEGORY: **SOIL REMEDIATION**

BACT Size: SMALL EMITTER (<10 LB/DAY) AND MIN **SOIL VAPOR EXTRACTION SYSTEM**

BACT Determination Number: 89	**BACT Determination Date:** 11/17/2014

Equipment Information

Permit Number: N/A -- Generic BACT Determination
Equipment Description: SOIL VAPOR EXTRACTION SYSTEM
Unit Size/Rating/Capacity: Soil vapor extraction with VOC <10 lb/day
Equipment Location:

BACT Determination Information

ROCs	**Standard:**	9.9 lb/day and %control based on influent
	Technology Description:	Catalytic Oxidizers, Thermal Oxidizers, Carbon Adsorption, or IC Engines that achieve the control efficiency requirements stated below
	Basis:	Achieved in Pactice
NOx	**Standard:**	
	Technology Description:	For thermal oxidizers: natural gas or propane fuel and good combustion practices For IC engines: LPG as an auxiliary fuel and 3-way catalytic converter
	Basis:	Achieved in Pactice
SOx	**Standard:**	
	Technology Description:	For thermal oxidizers: natural gas or propane fuel and good combustion practices For IC engines: LPG as an auxiliary fuel
	Basis:	Achieved in Pactice
PM10	**Standard:**	
	Technology Description:	For thermal oxidizers: natural gas or propane fuel and good combustion practices For IC engines: LPG as an auxiliary fuel
	Basis:	Achieved in Pactice
PM2.5	**Standard:**	
	Technology Description:	For thermal oxidizers: natural gas or propane fuel and good combustion practices
	Basis:	Achieved in Pactice
CO	**Standard:**	
	Technology Description:	For thermal oxidizers: natural gas or propane fuel and good combustion practices For IC engines: LPG as an auxiliary fuel and 3-way catalytic converter
	Basis:	Achieved in Pactice
LEAD	**Standard:**	
	Technology Description:	
	Basis:	

Comments: For Effluent VOC Concentrations <= 10 ppmv, no required % control efficiency
For Influent VOC Concentrations >= 2,000 ppmv, at least 98.5% control efficiency required
For Influent VOC Concentrations >= 200 ppmv and < 2,000 ppmv, at least 97% control efficiency required
For Influent VOC Concentrations < 200 ppmv at least 90% control efficiency required

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SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NO.: 89

DATE: November 14, 2014

ENGINEER: Michelle Joe

Category/General Equip Description: Soil Remediation

Equipment Specific Description: Soil Vapor Extraction (SVE)

Equipment Size/Rating: Small Emitter (< 10 lb/day) and Minor Source BACT

Previous BACT Det. No.: #29, 30, 31, & 32

This BACT determination will update Determination #29, 30, 31, & 32 which was made on April 5, 2012 for Soil Remediation – Soil Vapor Extraction (SVE).

BACT ANALYSIS

Step 1: Identify All Control Technologies

The following control technologies are currently employed as BACT for Soil Remediation – Soil Vapor Extraction (SVE) by the following BACT Clearinghouses:

<table>
<tr><th>BACT Clearinghouse</th><th>(A)</th><th>Best Available Control Technology (BACT)</th></tr>
<tr><td>SMAQMD</td><td>AP
AP
AP
AP</td><td>For VOC:
1. Catalytic Oxidizers
2. Thermal Oxidizers
3. Carbon Adsorption
4. IC Engines
Each subject to the following VOC control efficiencies and maximum emission limit:
<table>
<tr><th>For VOC Concentration at Influent of Control Device (ppmv):</th><th>For VOC Concentration at Effluent of Control Device (ppmv):</th><th>Required VOC Control Efficiency</th><th>Maximum Effluent VOC Daily Limit</th></tr>
<tr><td>N/A</td><td>≤10 ppmv</td><td>None</td><td rowspan="4">9.9 lb/day</td></tr>
<tr><td>≥2,000 ppmv</td><td>N/A</td><td>≥98.5%</td></tr>
<tr><td>≥200 ppmv to <2,000 ppmv</td><td>N/A</td><td>≥97%</td></tr>
<tr><td><200 ppmv</td><td>N/A</td><td>≥90%</td></tr>
</table></td></tr>
</table>

BACT Clearinghouse	(A)	Best Available Control Technology (BACT)
EPA RBLC	---	For VOC: A BACT standard has not been established.
CARB	---	For VOC: A BACT standard has not been established.
South Coast AQMD	---	For VOC: A BACT standard has not been established.
Bay Area AQMD	AP	For VOC: Two or more activated carbon canisters in series, thermal oxidizer or catalytic oxidizer to achieve: ≤10 ppmv at outlet of control device; or ≥98.5% capture/destruction efficiency if inlet VOC ≥2000 ppmv; or ≥97% capture/destruction efficiency if inlet VOC ≥200 to <2000 ppmv; or ≥90% capture/destruction efficiency if inlet VOC <200 ppmv.
San Joaquin Valley APCD	AP AP AP TF AP TF AP AP AP AP AP	For VOC: 1. Thermal Oxidizer @ 1400 °F and 0.5 sec at 95% or greater control 2. Catalytic Oxidizer @ 600 °F and 0.5 sec at 95% or greater control 3. IC Engine with LPG auxiliary fuel and 3-way catalytic converter at 95% control 4. IC Engine with natural gas or LPG auxiliary fuel and 3-way catalytic converter at 95% control 5. Carbon Adsorption at 95% control efficiency for uncontrolled emissions over 2 lb/day For NOx: *For Thermal Oxidizers:* natural gas with low NOx burner *For IC Engines:* LPG as an auxiliary fuel and 3-way catalytic converter For SOx: *For IC Engines:* LPG as an auxiliary fuel For PM10: *For IC Engines:* LPG as an auxiliary fuel For CO: *For Thermal Oxidizers:* natural gas with low NOx burner *For IC Engines:* LPG as an auxiliary fuel and 3-way catalytic converter

(A) AP = Achieved in Practice, TF = Technologically Feasible

The following control technologies have been identified:

For VOC:
1. Catalytic Oxidizers
2. Thermal Oxidizers
3. Carbon Adsorption
4. IC Engines

For NOx:
For Thermal Oxidizers: natural gas or propane fuel and good combustion practices
For IC Engines: LPG as an auxiliary fuel and 3-way catalytic converter

For SOx:
For Thermal Oxidizers: natural gas or propane fuel and good combustion practices
For IC Engines: LPG as an auxiliary fuel

For PM10:
For Thermal Oxidizers: natural gas or propane fuel and good combustion practices
For IC Engines: LPG as an auxiliary fuel

For PM2.5:
For Thermal Oxidizers: natural gas or propane fuel and good combustion practices
For IC Engines: LPG as an auxiliary fuel

For CO:
For Thermal Oxidizers: natural gas or propane fuel and good combustion practices
For IC Engines: LPG as an auxiliary fuel and 3-way catalytic converter

For Lead:
For Thermal Oxidizers: natural gas or propane fuel and good combustion practices

Step 2: Eliminate Technologically Infeasible Options

All identified technologies are feasible.

Step 3: Rank Remaining Control Technologies by Control Effectiveness

1. Catalytic Oxidizers – 90% to 98.5% control efficiency
2. Thermal Oxidizers – 90% to 98.5% control efficiency
3. Carbon Adsorption – 90% to 98.5% control efficiency
4. IC Engines – 90% to 98.5% control efficiency with LPG auxiliary fuel and 3-way catalytic converter

All control technologies are equally effective at controlling VOCs. SMAQMD has identified BACT as the use of catalytic oxidizers, thermal oxidizers, carbon adsorption systems, or IC engines that achieve a control efficiency dependent on the inlet VOC concentration described in Step 1. For soil vapor extraction systems that use thermal oxidizers, either natural gas or propane and good combustion practices shall be required as BACT for NOx, SOx, PM10, PM2.5, CO, and Lead since it has been achieved in practice. For soil vapor extraction systems that use IC engines, LPG as an auxiliary fuel and a 3-way catalytic converter shall be required as BACT for NOx, SOx, PM10, PM2.5, CO, and Lead since it has been achieved in practice.

Therefore, the most effective control technology identified in Step 3 is the use of catalytic oxidizers, thermal oxidizers (which use natural gas or propane fuel and good combustion practices), carbon adsorption systems, or IC engines (which use LPG as an auxiliary fuel and 3-way catalytic converter) that achieve a control efficiency dependent on the inlet VOC concentration described in Step 1.

Step 4: Select BACT

BACT for the control of VOC emissions from Soil Remediation – Soil Vapor Extraction is the use of catalytic oxidizers, thermal oxidizers (which use natural gas or propane fuel and good combustion practices), carbon adsorption systems, or IC engines (which use LPG as an auxiliary fuel and 3-way catalytic converter) that achieve a control efficiency dependent on the inlet VOC concentration described in Step 1.

REVIEWED BY: Brian F Kelly **DATE:** 12-1-14

APPROVED BY: [signature] **DATE:** 12-15-14